Republic of the Philippines
Department of Public Works and Highways

Intelligent Transport Systems (ITS) Forum 2017

Sponsored by
PCIEERD – DOST, DLSU – Manila, UP – NCTS, TSSP

Current State of ITS Applications in DPWH

February 17, 2017

5th Floor, Henry Sy Sr. Hall, DLSU, Manila

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Bureau of Quality and Safety

DPWH Profile

Mandate

- Planning, design, construction and maintenance of national roads and bridges and major flood control systems

(EO 124, s1987)

6 Bureaus
9 Services
17 Regional Offices
183 District Engineering Offices
20 Project Management Offices

VISION: By 2030, DPWH is an effective and efficient government agency, improving the life of every Filipino through quality infrastructure.

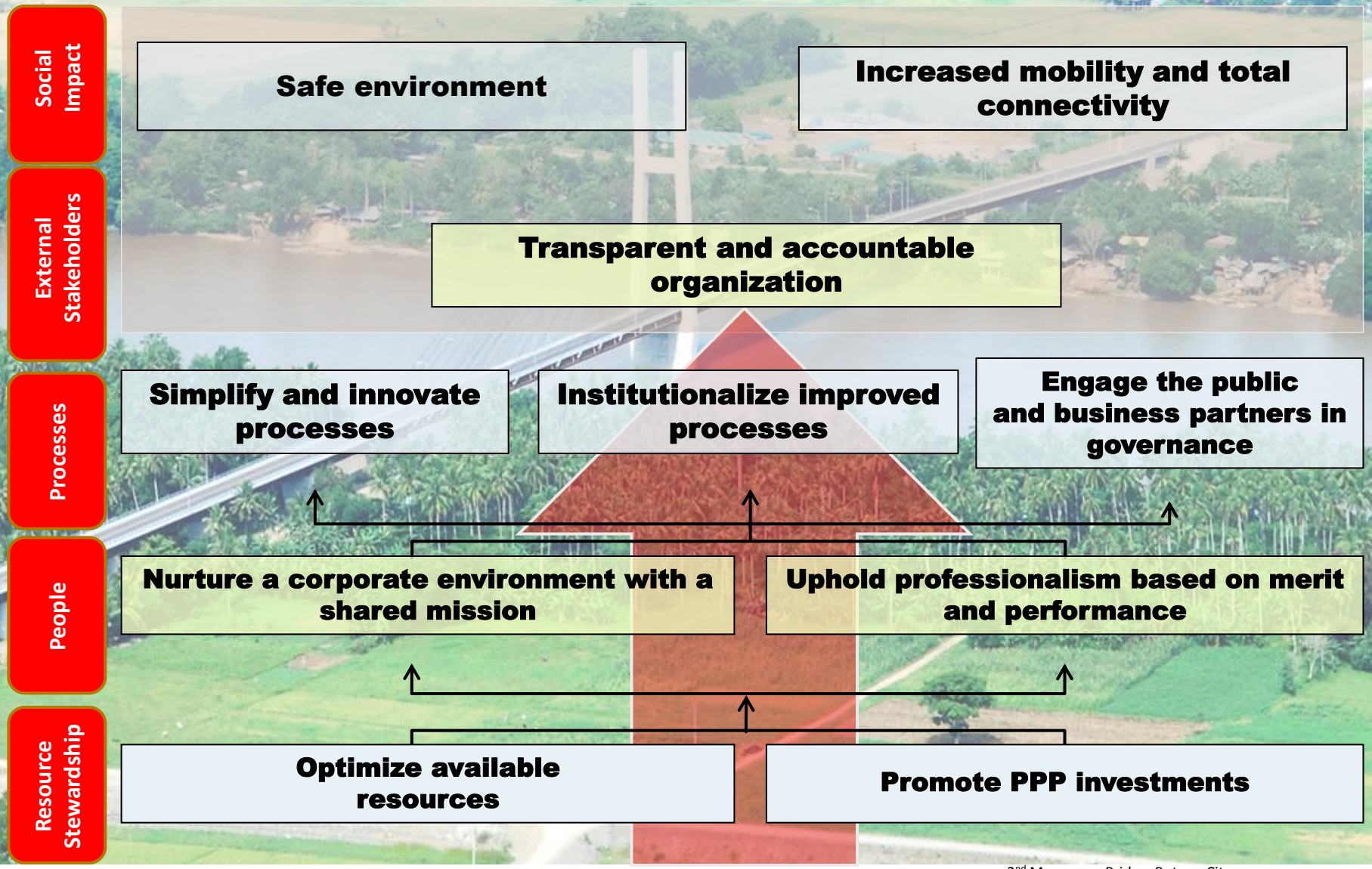
Right Project. Right Cost. Right Quality. Right on Time. Right People.

MISSION

To provide and manage quality infrastructure facilities and services responsive to the needs of the Filipino people in the pursuit of national development objectives.

CORE VALUES

Public Service
Integrity
Excellence
Professionalism
Teamwork

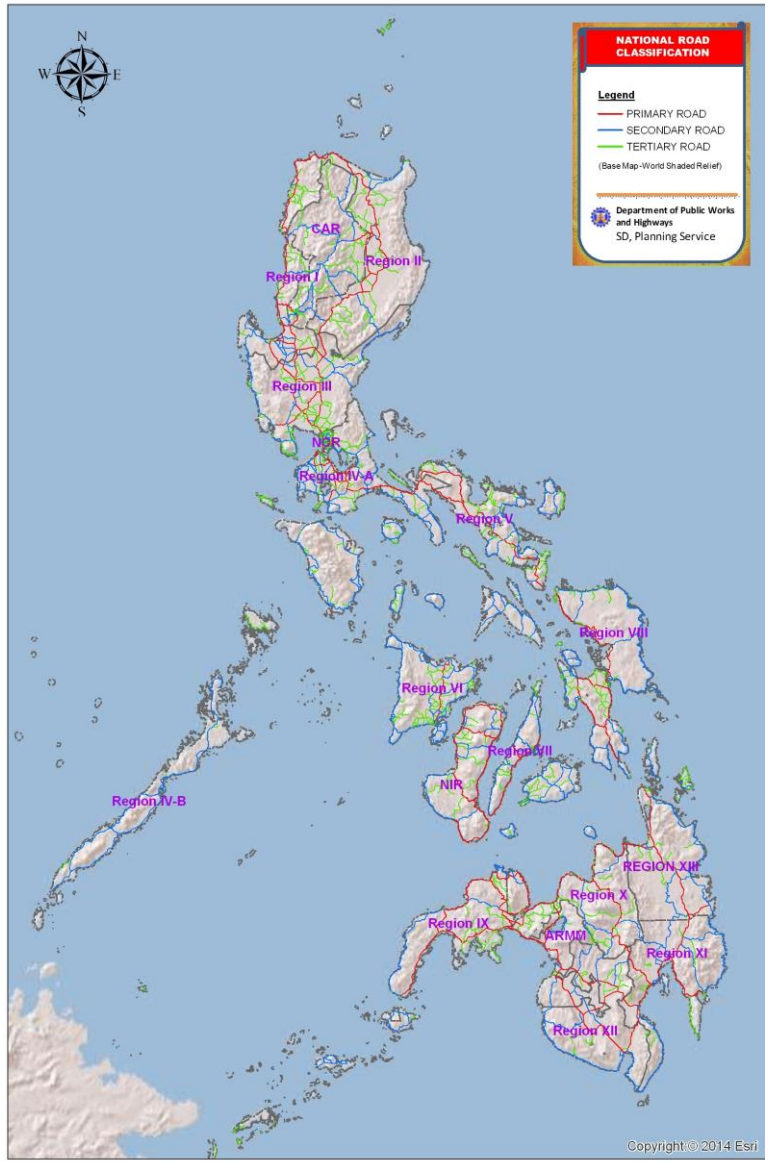


As of March 30, 2012

2nd Magsaysay Bridge, Butuan City

The Philippine Road Network

Based on 2015 Road Condition Data



Department of Public Works and Highways

Basic Mandate

Plan, Design, Construct and Maintain National Roads and Bridges and Flood Control Systems in Major and Principal Rivers

216,124 kms	Total Overall Road Network
32,633 kms	***Total National Road Length***
0.72 km/sq. km	Road Density
0.20 km/sq. km	Paved Road Density
0.28	Overall Paved Road Ratio
0.89	Paved Road Ratio for Nat'l. Roads

	length	unpaved	paved	%
*National Road	32,633.37	3,714.20	28,919.17	88.62%
Primary	7,066.74	7.83	7,058.91	99.89%
Secondary	14,118.49	1,465.05	12,653.43	89.62%
Tertiary	11,448.14	2,241.31	9,206.83	80.42%
Prov'l Roads	31,233.230	21,457.630	9,775.600	31.30%
City Roads	14,739.385	5,537.614	9,201.771	62.43%
**Municipal Roads	15,816.000	10,422.000	5,394.000	34.10%
**Barangay Roads	121,702.000	113,682.000	8,020.000	6.59%
Total	216,123.99	154,813.44	61,310.54	28.37%

** Based on Road Condition Data as of cy2015*
*** As of cy2002*

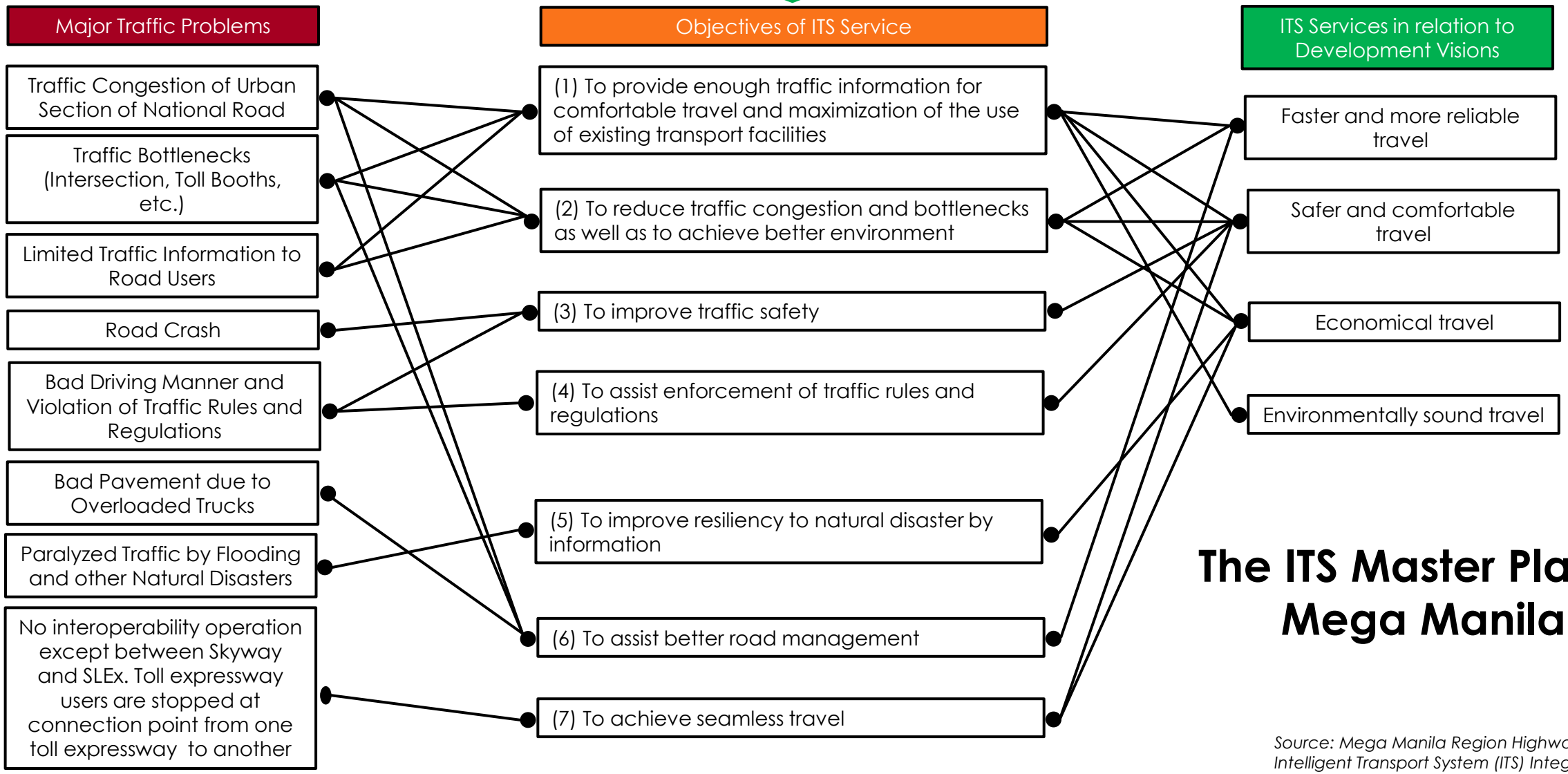
DPWH ITS Initiatives

ITS Background in the Philippines

- In 2012, the GOJ, thru JICA, undertake the study on the Mega Manila Region Highway Network Intelligent Transportation System (ITS) Master Plan
- DPWH and MMDA, on behalf of the GOP, act as counterpart to the Japanese Study Team
- The study area covered expressways and urban roads in National Capital Region, Region III and Region IV-A
- The Study was completed in 2013

Overall Goal of ITS Service

- To reduce traffic congestion
- To provide safe, comfortable and less frustrating travel
- To contribute for sound environment



The ITS Master Plan in Mega Manila

Source: Mega Manila Region Highway Network Intelligent Transport System (ITS) Integration Project

Overall Goal of ITS Service

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- To contribute for sound environment

ITS Development Areas

•Traffic Signal Control	: (2)
•Traffic Information Provision	: (1), (2), (5)
•Traffic Safety Assistance	: (3)
•Public Utility Vehicle Management	: (4)
•Traffic Enforcement Assistance	: (4)
•Road Management Assistance	: (6)
•Automated Toll and Fare Collection	: (7)

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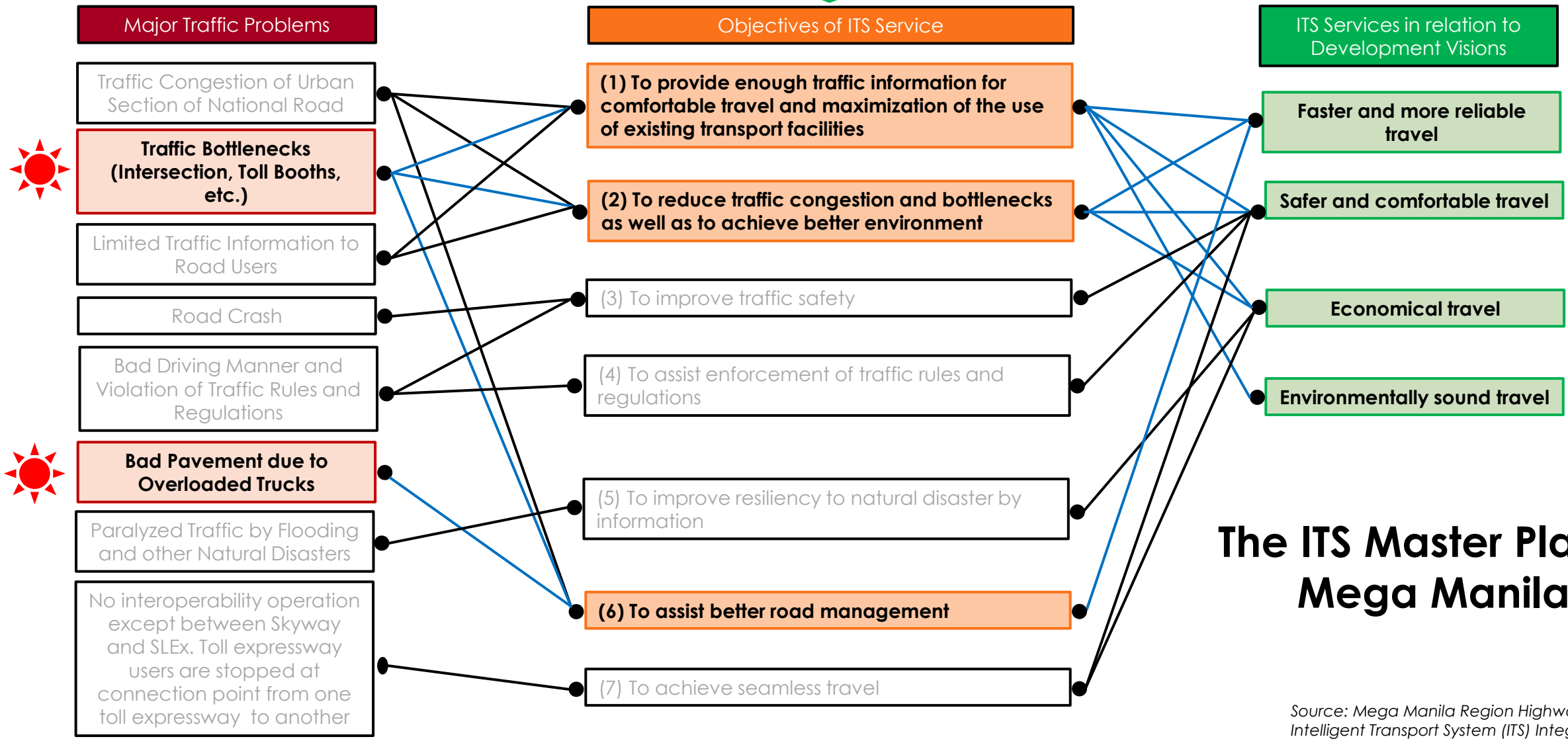

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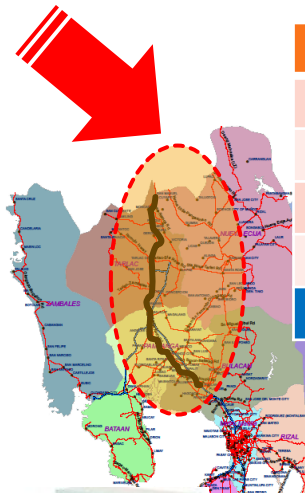
CURRENT ITS APPLICATION ON NATIONAL HIGHWAYS

[1] TRAFFIC SIGNALIZATION

Traffic Management Project along Manila North Road (MNR)



SUMMARY BY PROVINCE		
	SIGNALIZED	UNSIGNALIZED
BULACAN	20	4
PAMPANGA	14	5
TARLAC	19	4
TOTAL	**53**	**13**

- **Microprocessor-based Traffic Controllers**
- **LED-based Traffic Signal Heads**
- **Fully-actuated design using loop-based detection on each lane near stop lines**

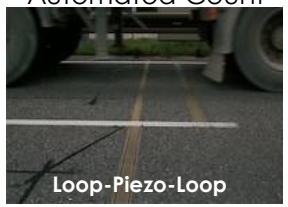
- Aldridge Traffic Controllers (Australia)
- Swarco Traffic Controllers (Austria)

Video Camera Sensor (Trial Scheme on 2 locations)

[2] NRTSP

National Road Traffic Survey Program

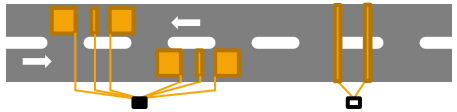
Automated Count



Manual Count

Manual Axle Load Survey

Road Tubes



Permanent Stations Temporary Stations

RTIA

1,666 Automated Survey Sites:
- Permanent 578
- Temporary 1,088

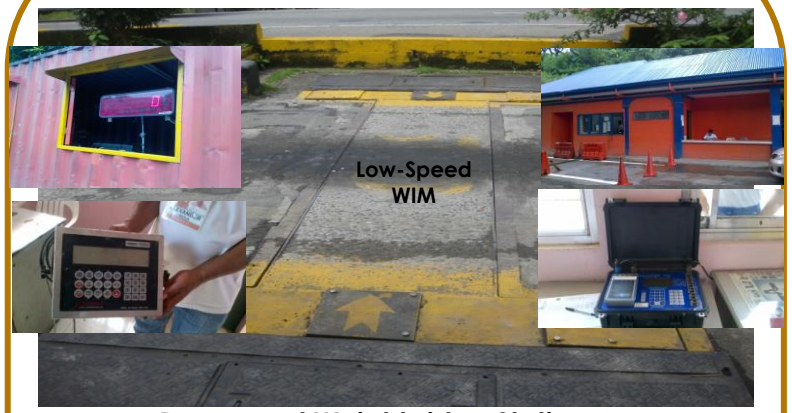
Axle Load Survey Sites 87

RBIA

❑The Road and Bridge Information Applications (RBIA) is the DPWH's central repository for network-level Road and Bridge related data.

AADT ESAL

[3] ANTI-TRUCK OVERLOADING PROGRAM



Permanent Weighbridge Stations

Mobile Enforcement Stations

THE CURRENT ISSUE of TRAFFIC CONGESTION

Metro Manila has 'worst traffic on Earth,' longest commute – Waze
CNN Philippines
October 2, 2015

- Metro Manila's traffic jams estimated at least 3 billion pesos ($64 million) a day (0.8% of GDP)

http://www.philstar.com/headlines/2015/09/16/1500512/metro-manila-traffic-costing-philippines-p3-billion-day

BQS STRATEGY MAP

VISION: BQS shall be a leading advocate of quality assurance and safety practices.

MISSION

BQS shall develop and set effective standards to ensure the safety of all infrastructure facilities in the country, establish traffic engineering policies and to assure efficiency and proper quality in the construction and maintenance of government public works

CORE VALUES

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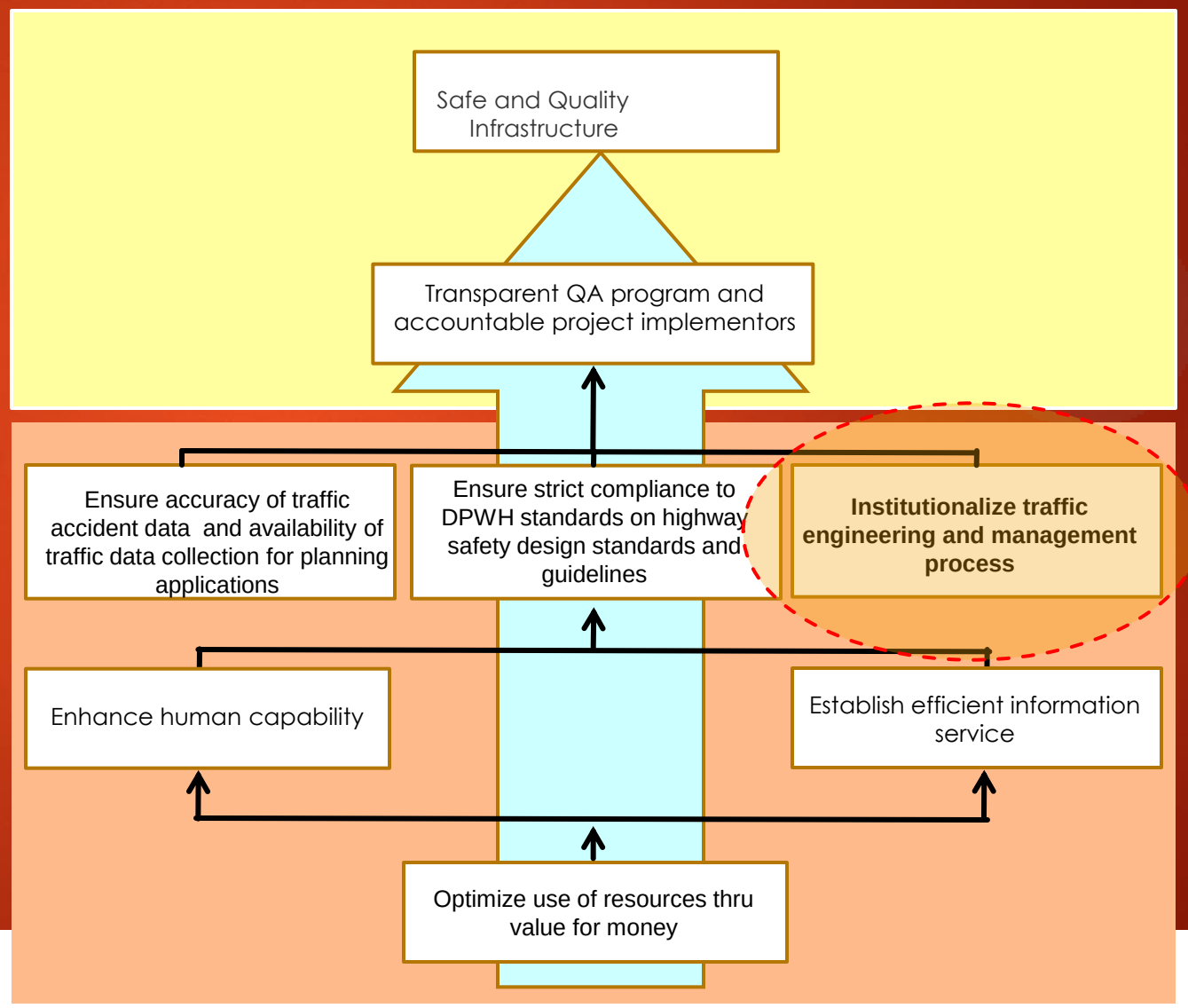
Teamwork



Renewal of DPWH Scorecard and Strategy Map

PGS Scorecard 2011 – 2016

P		STRATEGIC OBJECTIVES		MEASURES	2010	2011		2012		2013	2015	2016
					ACTUAL	TARGET	ACTUAL	TARGET	ACTUAL	TARGET	TARGET	TARGET
Social Impact	A	Increased mobility and total connectivity	1	% of National Road Network paved (Total Length - 31,242 Km)	80.9% (25,281)	83% (25,916)	82.8% (25,879)	85.7% (26,778)	84.2% (26,306)	88.4% (27,627)	97.0% (30,316)	100% (31,242)
			2	% of bridges along national roads made permanent (Total Length - 345,978 Lm)	96% (332,139)	96.8% (335,043)	96.4% (333,597)	97.5% (337,329)	96.9% (335,391)	96.75% (340,510)	99.5% (344,248)	100% (345,978)
			3	Km of arterial roads with an International Roughness Index (IRI) of 3	NA	1,400	No data	1,400	No data	1,400	4,800	6,600
	B	Safe Environment	4	Percentage of flood protected area (identified major and principal river basins)	NA	12.8%	12.8%	13.5%	13.5%	14.4%	17.9%	19.7%
			5	% of national roads and bridges covered by iRAP safety audits	5%	15%	18%	31%	28%	34%	48%	55%

PGS Scorecard 2017 – 2022 (proposed)

	MEASURE	BL	2017	2018	2019	2020	2021	2022
Provide the engineering solution to road safety concern	% of critical intersections along N1 and primary roads along priority corridors with completed traffic engineering interventions (Intersection with VCR ranging from 0.66 to 1.20 = 943 int)			6%	10%	15%	21%	26%

[1] TRAFFIC SIGNALIZATION

Highlight of Major Transport & Traffic Improvement Projects implemented by DPWH

Metro Manila TEAM Phase I

- Fund Source : World Bank – IBRD; component of Manila Urban Dev't Project
- Cost : MPhp 137.641
- No. of Intersections : 134
- Scope of Works:
  (1) 1 Radio Base Station
  (2) 1 Control Center
  (3) 10 CCTV Monitoring System
  (4) Traffic Signs & Road Markings, bus/jeepney priority lanes, bus stop & pedestrian waiting shed

Metro Manila TEAM Phase II

- Fund Source : OECF under 10th Yen Credit Loan Package
- Cost : MPhp 518.903
- No. of Intersections : 176 (172 intersections & 4 pedestrian crossing w/in C2 & C4 EDSA)
- Scope of Works:
  (1) 4 Radio Base Station
  (2) 4 CCTV Cameras
  (3) 2 Driver Information System
  (4) 60 mobile radios
  (5) 80 motorcycle radios
  (6) 100 portable radios
  (7) 2 Sub-Station (Makati & Cubao)

Metro Manila TEAM Phase III

- Fund Source : OECF under 14th Yen Credit Loan Package
- Cost : MPhp 811.497
- No. of Intersections : 145
- Scope of Works:
  (1) 5 CCTV cameras at EDSA
  (2) 4 Pollution Monitoring System
  (3) 60 Portable Radio
  (4) 82 streetlighting
  (5) 1 Sub-Station in Caloocan

Metro Cebu TEAM Project

- Fund Source : Australian Gov't
- The TEAM-PMO provided the technical assistance during implementation
- No. of Intersections : 68
- Scope of Works:
  (1) Radio Base Station
  (2) Control Center
  (3) 4 Mobile Radio
  (4) 2 Motorcycle Radio
  (5) 10 Portable Radio

[1] TRAFFIC SIGNALIZATION

Highlight of Major Transport & Traffic Improvement Projects implemented by DPWH

1995

Metro Manila TEAM Phase IV

Fund Source : EFIC (Australia)

Cost : BPhp 1.7

No. of Intersections : 419

Scope of Works:
(1) Introduction of SMART (State of the Art Metro Manila Adaptive & Responsive Traffic Signal System)
(2) Upgrading & Rehabilitation of exisitng traffic signals adopting the SCATs System (Sydney Coordinated Adaptive Traffic Signal System

2003

DPWH TEAM-PMO function for Metro Manila was transferred to MMDA

DPWH operationalized the TEAM-PMO under D.O. 150, s2003

DPWH TEAM-PMO to handle traffic engineering & mng't function nationwide except Metro Manila

2004

Traffic Management along Manila North Road Project

Fund Source : DPWH Regular Infra

Cost : MPhp 899.98 fr 2004 -2011

No. of Intersections : 66

Scope of Works:
(1) Intersection geometric improvement
(2) Fully-adaptive traffic signals using loop and video detectors

2013

DPWH Rationalization Plan was implemented

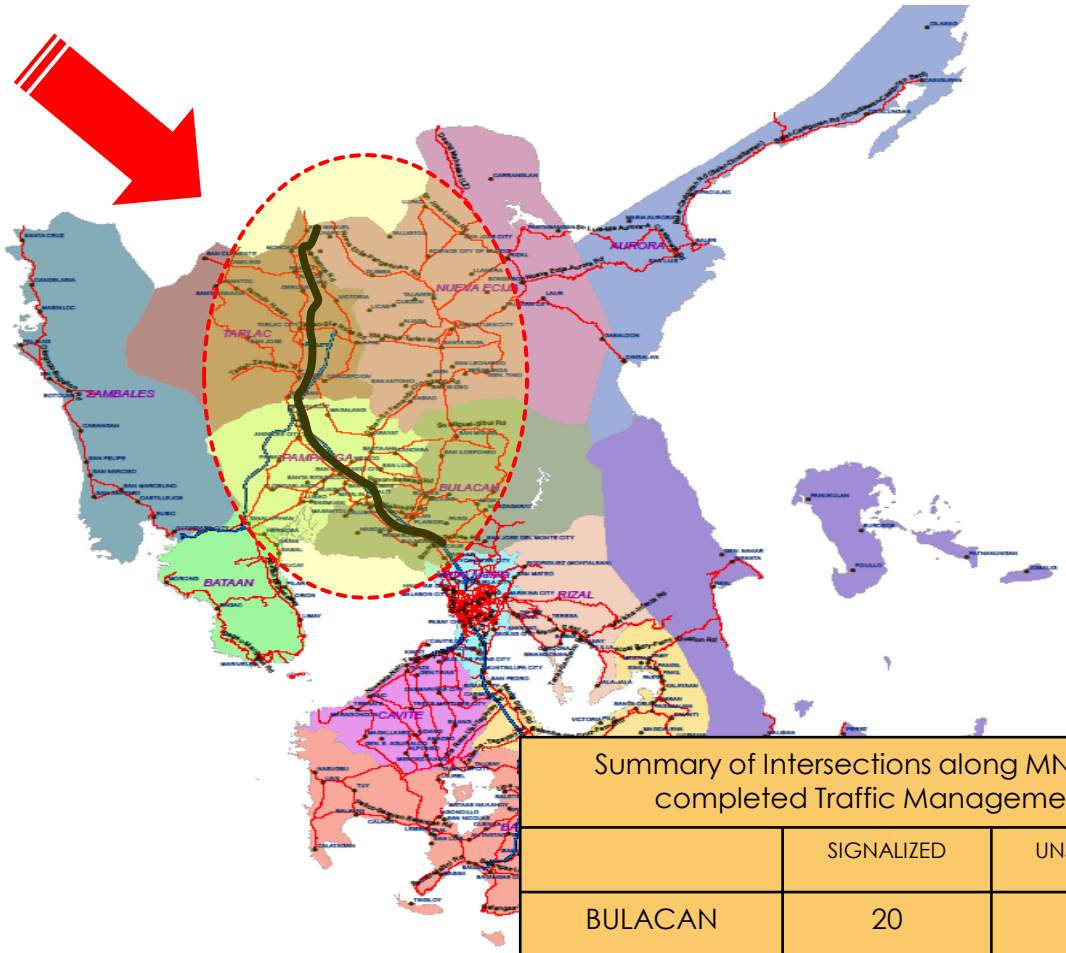
DPWH TEAM-PMO was dissolved and traffic engineering function was integrated into the newly-created Bureau of Quality and Safety

Year Started

[1] TRAFFIC SIGNALIZATION

Traffic Management along Manila North Road (MNR) Project

- In 2004, DPWH was tasked to develop and implement traffic improvement programs along major arterial roads
- DPWH selected McArthur Highway (or Manila North Road) from Bulacan to Tarlac for immediate road widening with doable traffic management because of noted increase in traffic demand and high frequency of traffic accidents. Likewise, the public is clamoring for an alternate route to the North in view of increased toll rates at new NLEX
- NEDA, at that time, was also promoting McArthur Highway as a heritage highway leading to tourist spot destinations in the North

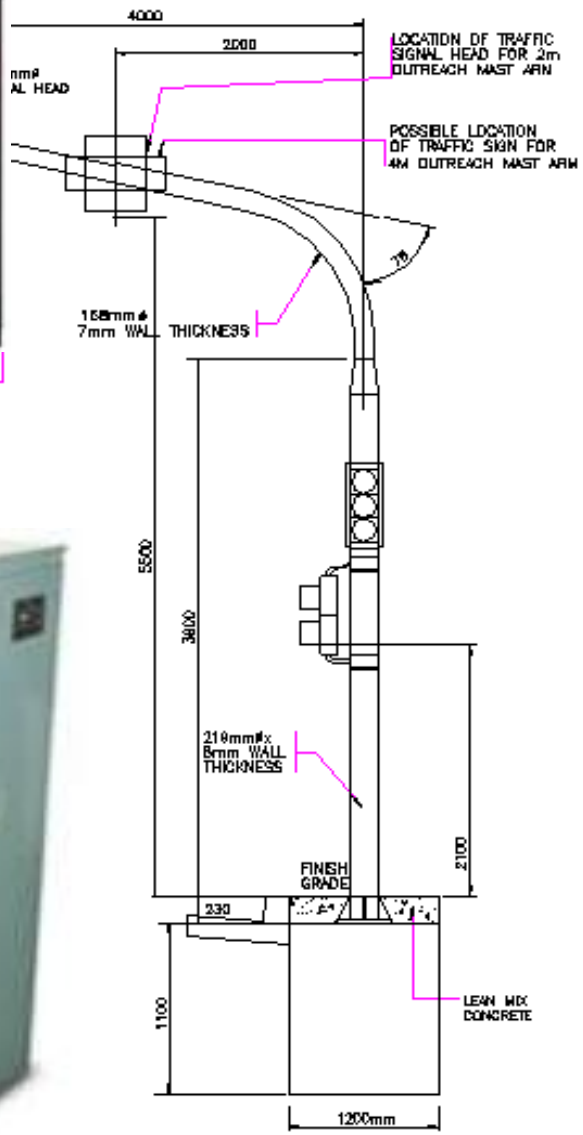


Summary of Intersections along MNR with completed Traffic Management

	SIGNALIZED	UNSIGNALIZED
BULACAN	20	4
PAMPANGA	14	5
TARLAC	19	4
TOTAL	53	13

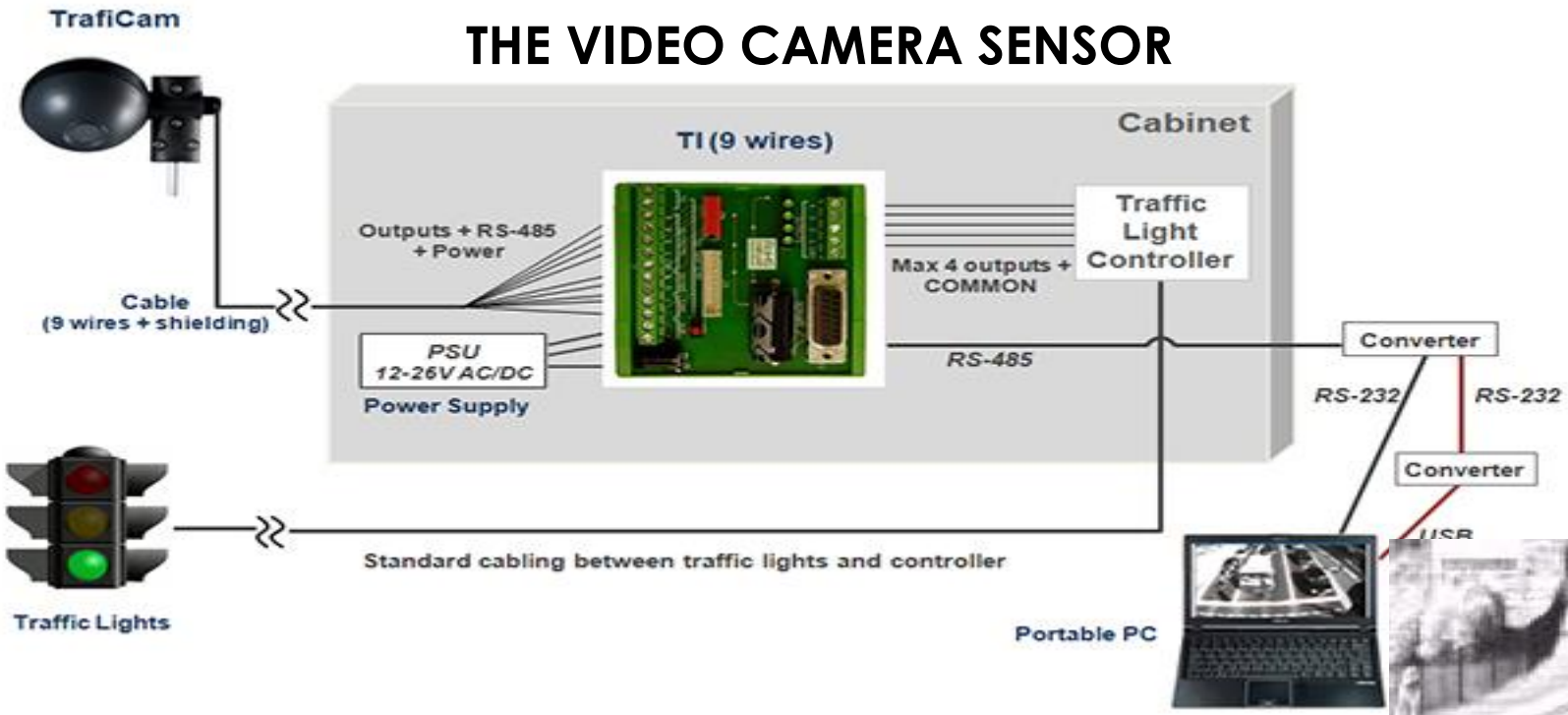
[1] TRAFFIC SIGNALIZATION

- Microprocessor-based Traffic Controller
- LED-based Traffic Signal Lanterns
- Fully-Actuated Design using Loop-based and Video Camera Sensors

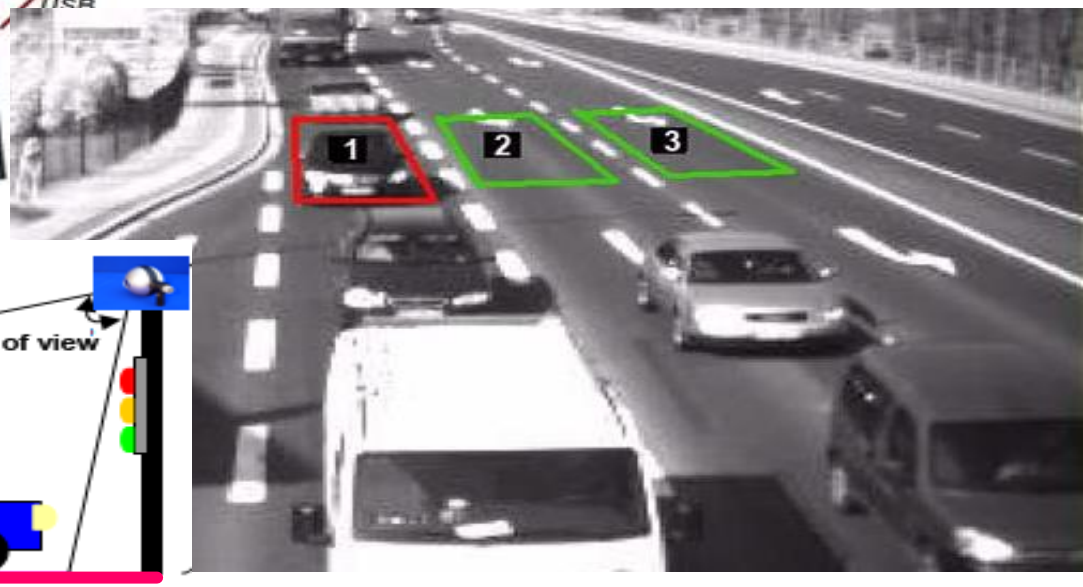


[1] TRAFFIC SIGNALIZATION

THE VIDEO CAMERA SENSOR

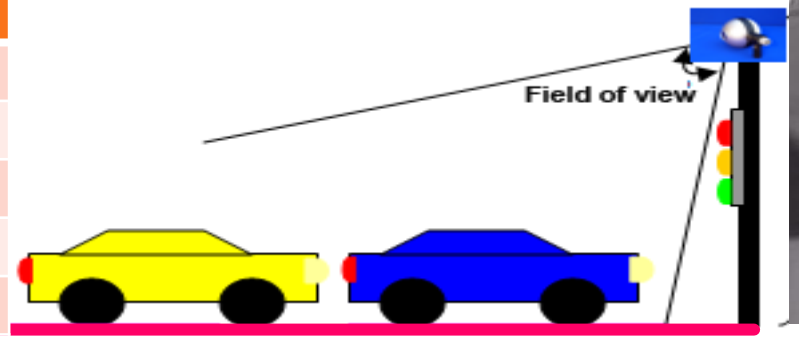


- Integrates both camera and detector
- Has vehicle counting function
- Network-based, IP-addressable detector
- Fast and easy above-ground installation
- Multi-lane detection coverage

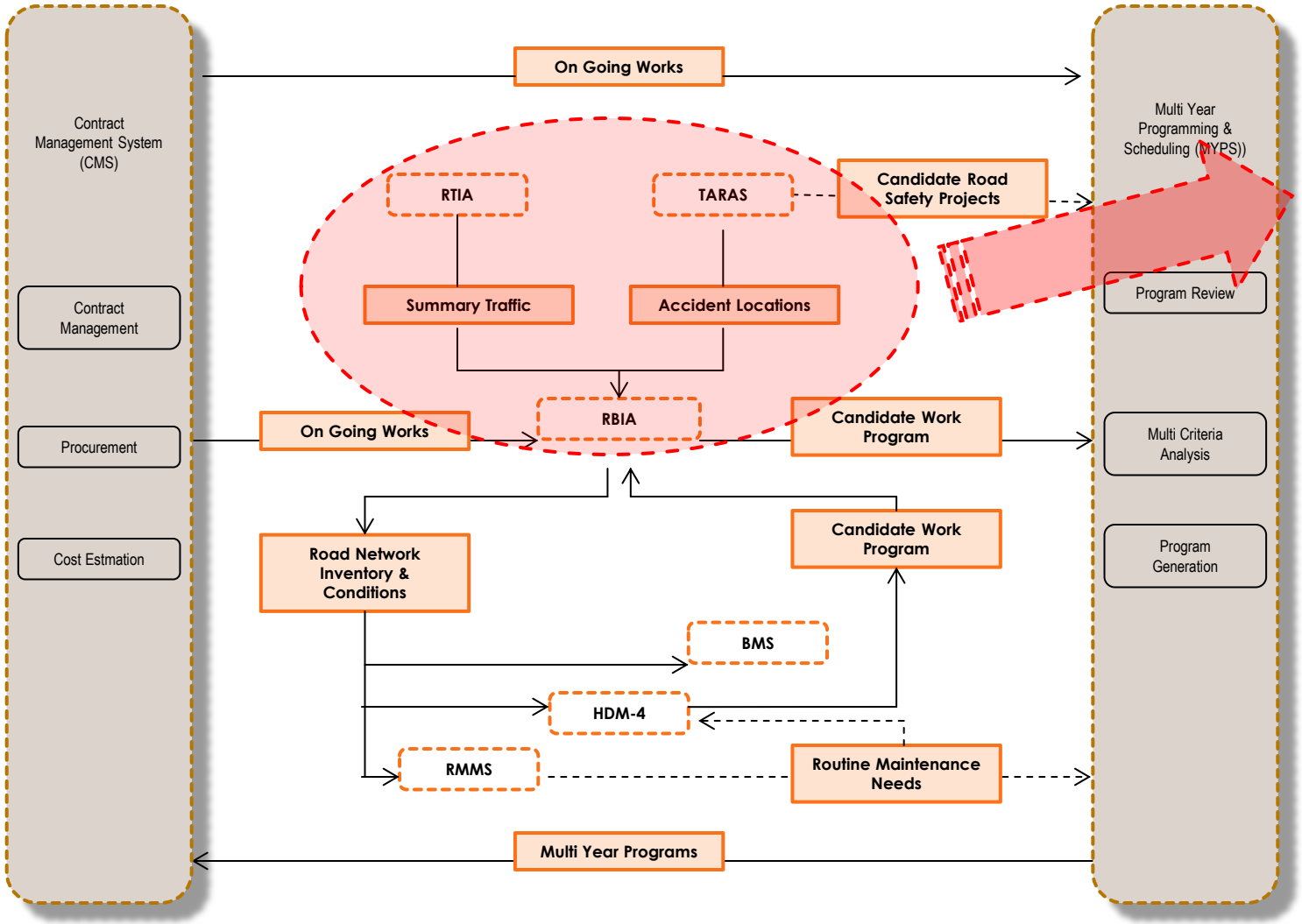


Intersections with VIDEO CAMERA SENSORS

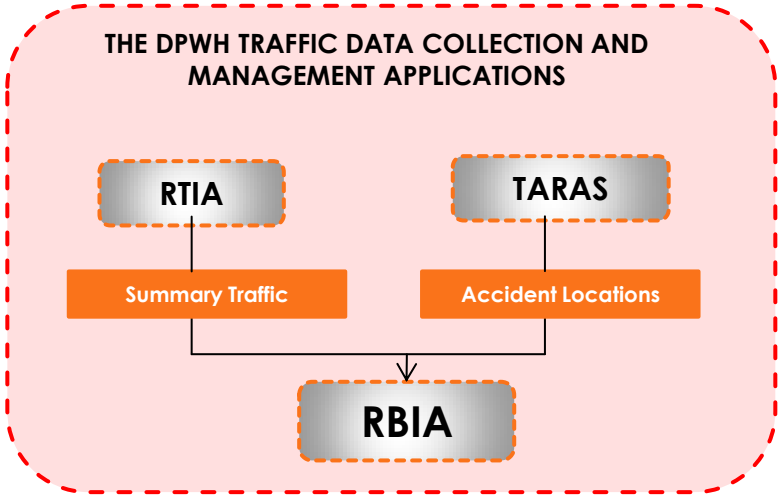
	INTERSECTION	LGU
1.	MNR – ROMULO	Tarlac City, Tarlac
2.	MNR – FAUSTA	Malolos, Pampanga
3.	MNR – TIKAY	Malolos, Pampanga
4.	MNR - MERCADO	Guiguinto, Bulacan
5.	MNR - SULLERA	Meycauayan, Bulacan



[2] The National Road Traffic Survey Program (NRTSP)



THE DPWH INTEGRATED INFRASTRUCTURE PLANNING PROCESS



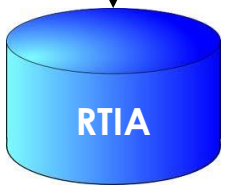
- DPWH database, although representing network-level information, plays a vital role in road management and could be tapped for ITS model development

[2] The National Road Traffic Survey Program (NRTSP)

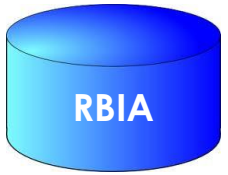
Automated Count

Manual Count

Manual Axle Load Survey



The RTIA is a set of applications that supports the activities of NRTSP. The traffic information is an important input in HDM-4, an application tool for an improved Highway Planning Processes being implemented by DPWH.



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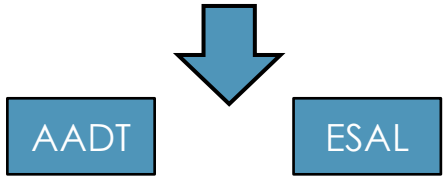


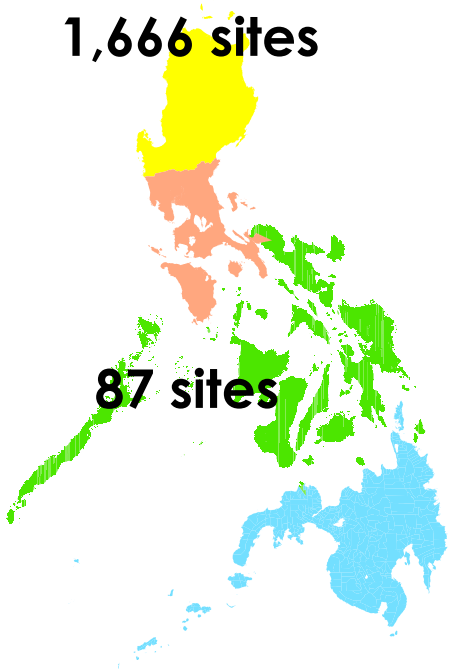
At the project level, heavy vehicle count data for buses and freight vehicle are needed in the design of pavement structures (thickness of subbase course, base course and surfacing) and maintenance.

- The volume of vehicles and traffic mix converted into annual average daily traffic (AADT) or equivalent passenger car units (pcu) per day/hour are needed to determine volume/capacity ratios for assessment of widening of existing roads/bridges or construction of new roads/bridges.
- Asset preservation planning (i.e. asphalt overlay) also requires traffic data to determine the optimal schedule for project implementation.

TRAFFIC SURVEY SITES ESTABLISHED IN 2004

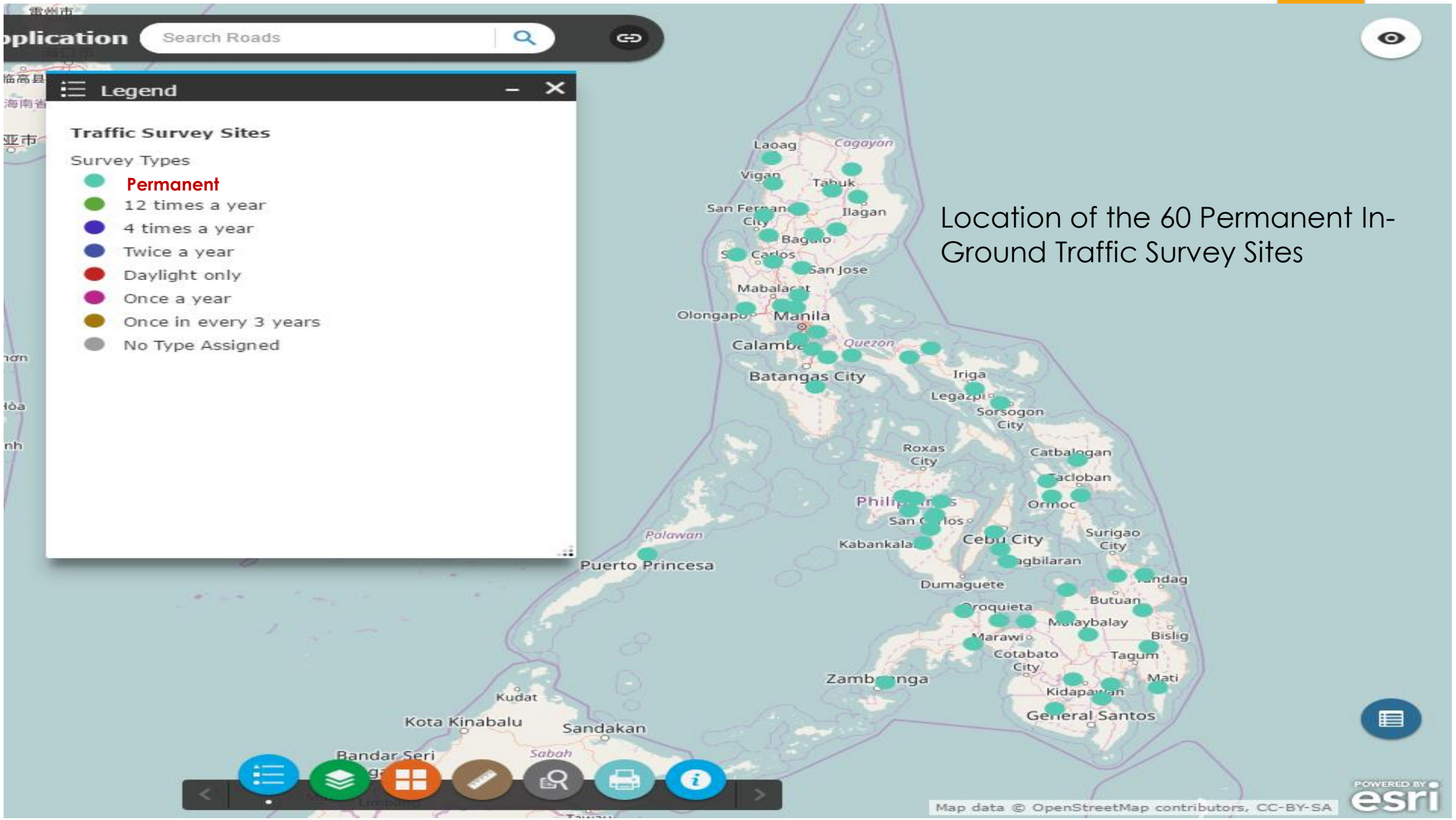
2,600 sites

- **TRAFFIC COUNT SURVEY (Manual) - 934 sites**
- **TRAFFIC COUNT SURVEY (Automated) - 1,666 sites**
  - In-ground sensors - 578 sites
  - On-ground (road tubes) - 1,088 sites
- **AXLE LOAD SURVEY - 87 sites**



Traffic Survey Sites Established in 2004

Traffic Survey Type (frequency)	Duration	Total	Automated		Manual
Long-Duration			In-Ground		
Permanent	365 days	60		60	0
12 times a year	1 week	137		113	24
Medium-Duration					
4 times a year	1 week	489		405	84
Twice a year	1 week	364	On-Ground	225	139
Once a year	1 week	814		675	139
Short-Duration					
Once in every 3 years	1 week	536		188	348
Daylight only	12 hours x 2 days	200		0	200
TOTAL		**2,600**	**1,666**		**934**


Search Roads
Legend
Traffic Survey Sites
Survey Types
Permanent
12 times a year
4 times a year
Twice a year
Daylight only
Once a year
Once in every 3 years
No Type Assigned
Location of the 60 Permanent In-Ground Traffic Survey Sites
Laoag
Cagayan
Vigan
Tabuk
Ilagan
Baguio
San Jose
Manila
Batangas City
Quezon
Iriga
Sorsogon City
Roxas City
Catbalogan
Ormoc
Cebu City
Surigao City
Dumaguete
Butuan
Marawi
Cotabato City
Tagum
Mati
General Santos
Puerto Princesa
Palawan
Kudat
Kota Kinabalu
Sandakan
Sabah
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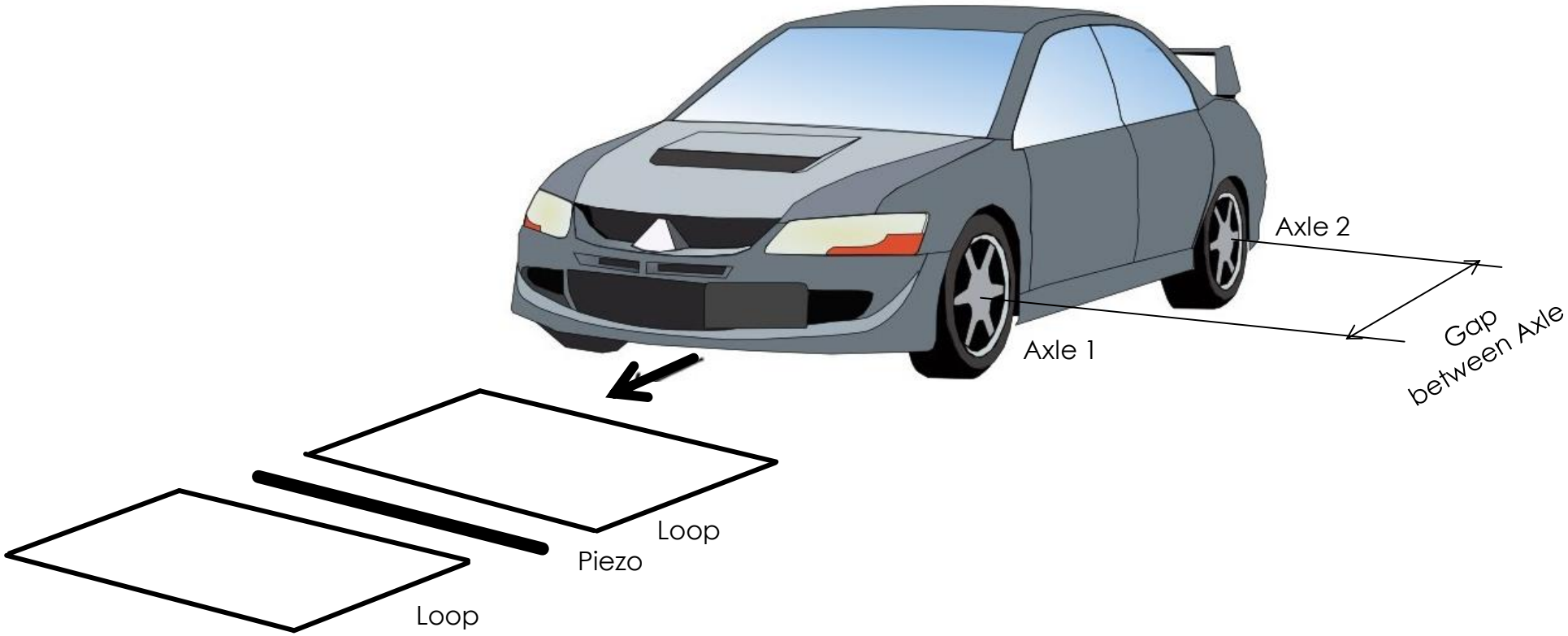
Vehicle Classification using Loop-Piezo-Loop Sensor Configuration

Vehicle Type
1. Motor-tricycles
2. Passenger Cars
3. Passenger Utilities
4. Goods Utilities
5. Small Buses
6. Large Buses
7. Rigid Trucks, 2 axles
8. Rigid Trucks, 3+ axles
9. Trucks Semi-Trailer, 3 and 4 axles
10. Truck Semi-Trailer, 5+ axles
11. Truck Trailers, 4 axles
12. Truck Trailers, 5+ axles

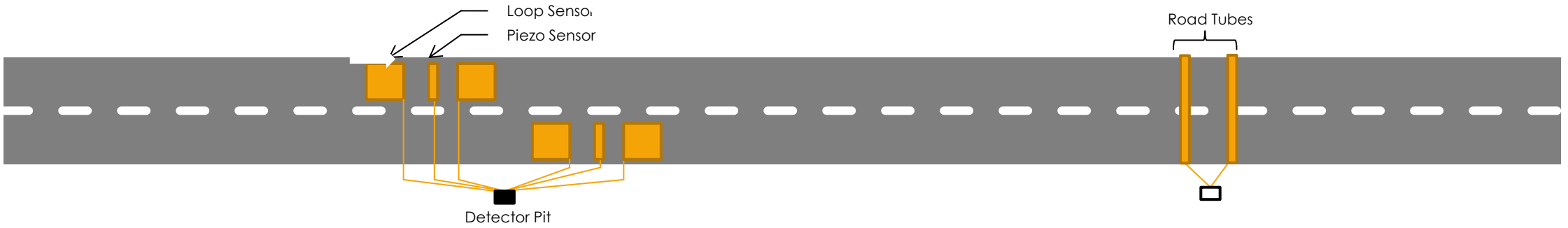


[1] The National Road Traffic Survey Program (NRTSP)

Two Types of Automated Traffic Counting

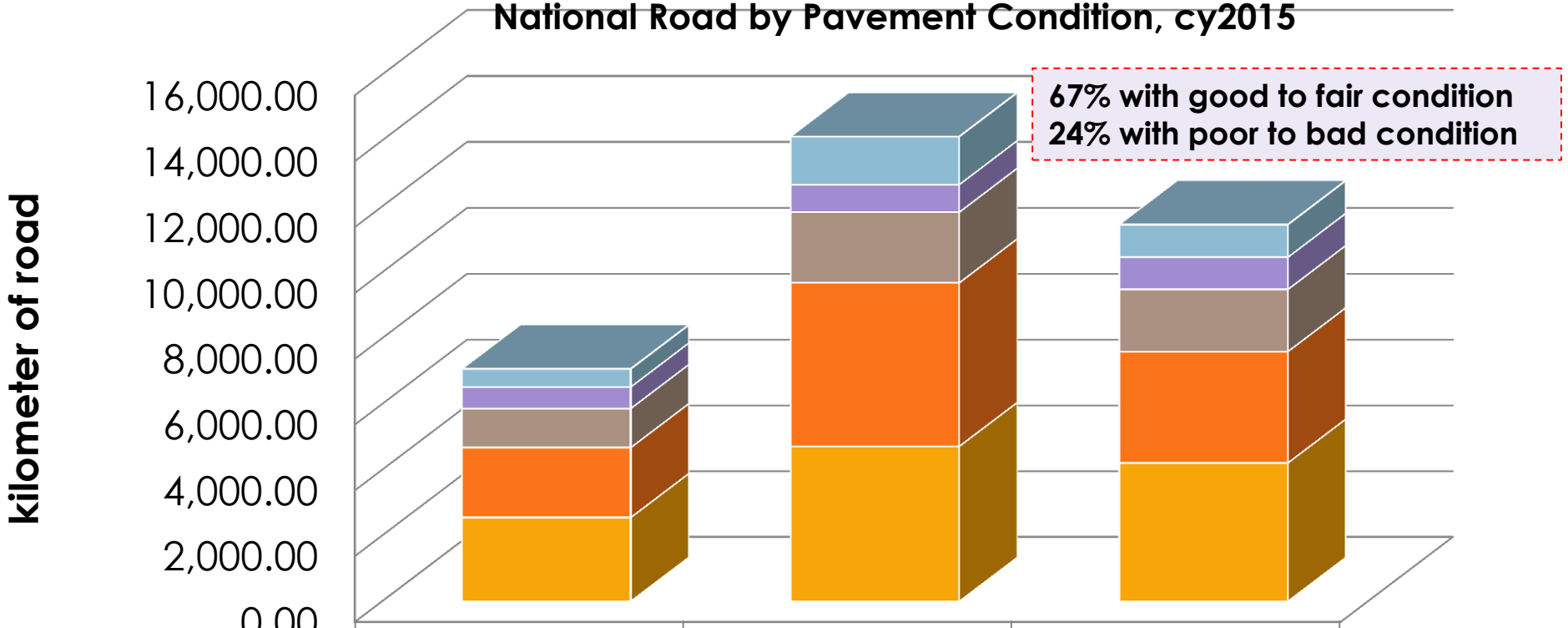
- In-Ground

- On-Ground



THE CURRENT ISSUE of OVERLOADED TRUCKS

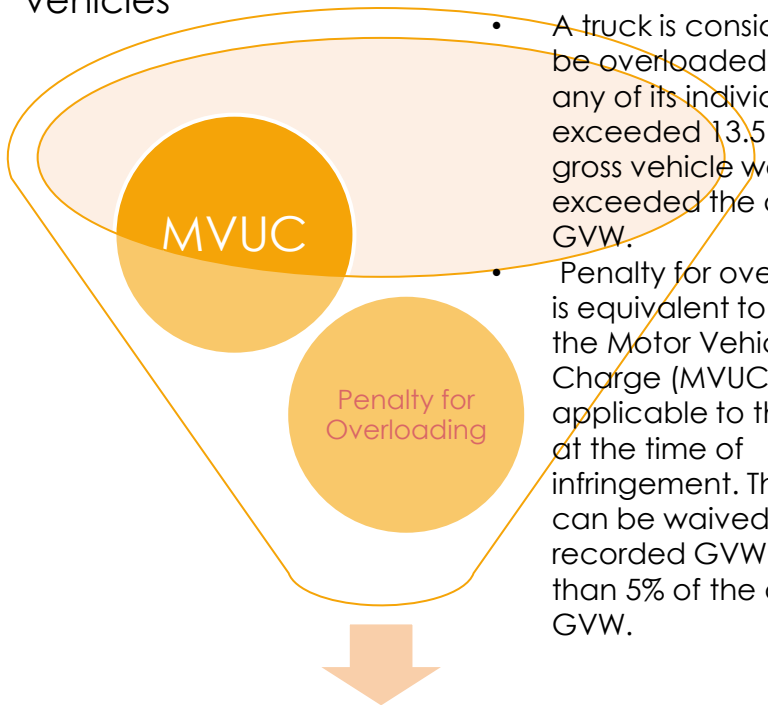
[3] ANTI-TRUCK OVERLOADING PROGRAM



	Primary	Secondary	Tertiary
No assessment	547.73	1,454.68	988.73
Bad	654.59	836.01	976.38
Poor	1,189.06	2,143.10	1,887.63
Fair	2,125.54	4,969.39	3,386.67
Good	2,549.81	4,715.29	4,208.73

[3] ANTI-TRUCK OVERLOADING PROGRAM

- **Legal Framework: Republic Act No. 8794**
  – An act imposing a motor vehicle user's charge on owners of all types of motor vehicles

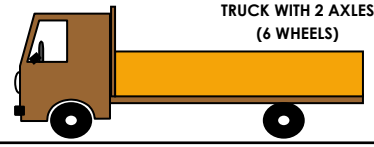
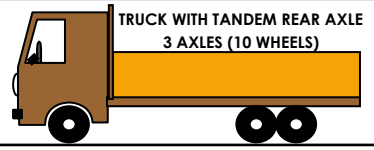
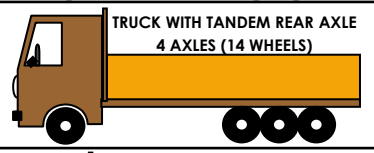
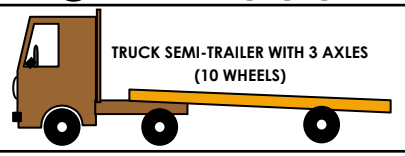
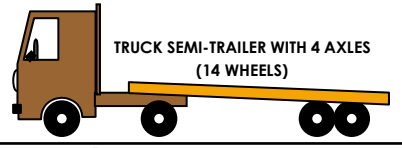
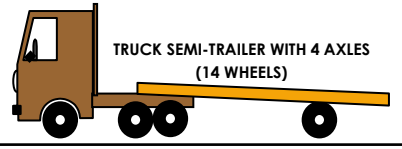
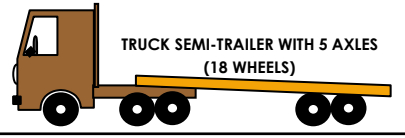


- A truck is considered to be overloaded when any of its individual axle exceeded 13.5 tons or it gross vehicle weight exceeded the allowable GVW.
- Penalty for overloading is equivalent to 25% of the Motor Vehicle User's Charge (MVUC) applicable to the truck at the time of infringement. This penalty can be waived when the recorded GVW is less than 5% of the allowable GVW.

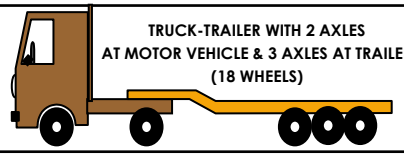
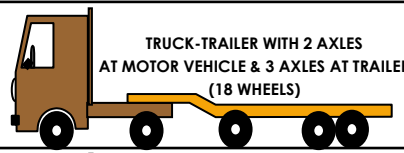
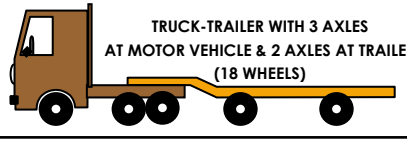
COLLECTION

- Special Road Support Fund
- Special Local Road Fund
- Special Road Safety Fund
- Special Vehicle Pollution Control Fund

REVISED as of CY2013

TRUCK CLASS	MAX. ALLOWABLE GVW (in kg)
 TRUCK WITH 2 AXLES (6 WHEELS)	18,000
 TRUCK WITH TANDEM REAR AXLE 3 AXLES (10 WHEELS)	33,300
 TRUCK WITH TANDEM REAR AXLE 4 AXLES (14 WHEELS)	35,600
 TRUCK SEMI-TRAILER WITH 3 AXLES (10 WHEELS)	34,000
 TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	40,600
 TRUCK SEMI-TRAILER WITH 4 AXLES (14 WHEELS)	39,700
 TRUCK SEMI-TRAILER WITH 5 AXLES (18 WHEELS)	41,500

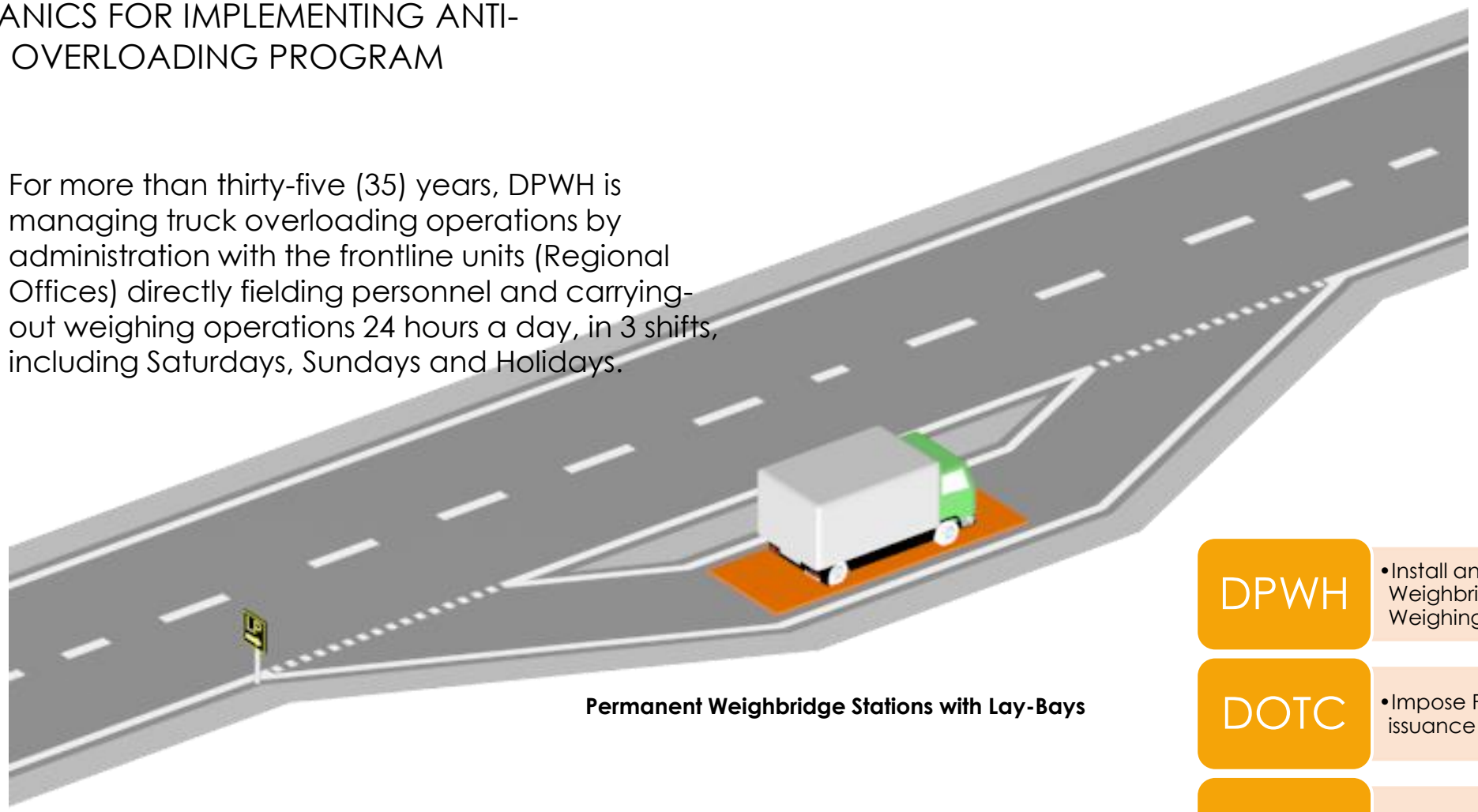
REVISED as of CY2013

TRUCK CLASS	MAX. ALLOWABLE GVW (in kg)
 TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	41,000
 TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (14 WHEELS)	39,700
 TRUCK-TRAILER WITH 2 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (18 WHEELS)	43,500
 TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	42,000
 TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 2 AXLES AT TRAILER (18 WHEELS)	43,500
 TRUCK-TRAILER WITH 3 AXLES AT MOTOR VEHICLE & 3 AXLES AT TRAILER (22 WHEELS)	45,000

[3] ANTI-TRUCK OVERLOADING PROGRAM

MECHANICS FOR IMPLEMENTING ANTI-TRUCK OVERLOADING PROGRAM

- For more than thirty-five (35) years, DPWH is managing truck overloading operations by administration with the frontline units (Regional Offices) directly fielding personnel and carrying-out weighing operations 24 hours a day, in 3 shifts, including Saturdays, Sundays and Holidays.

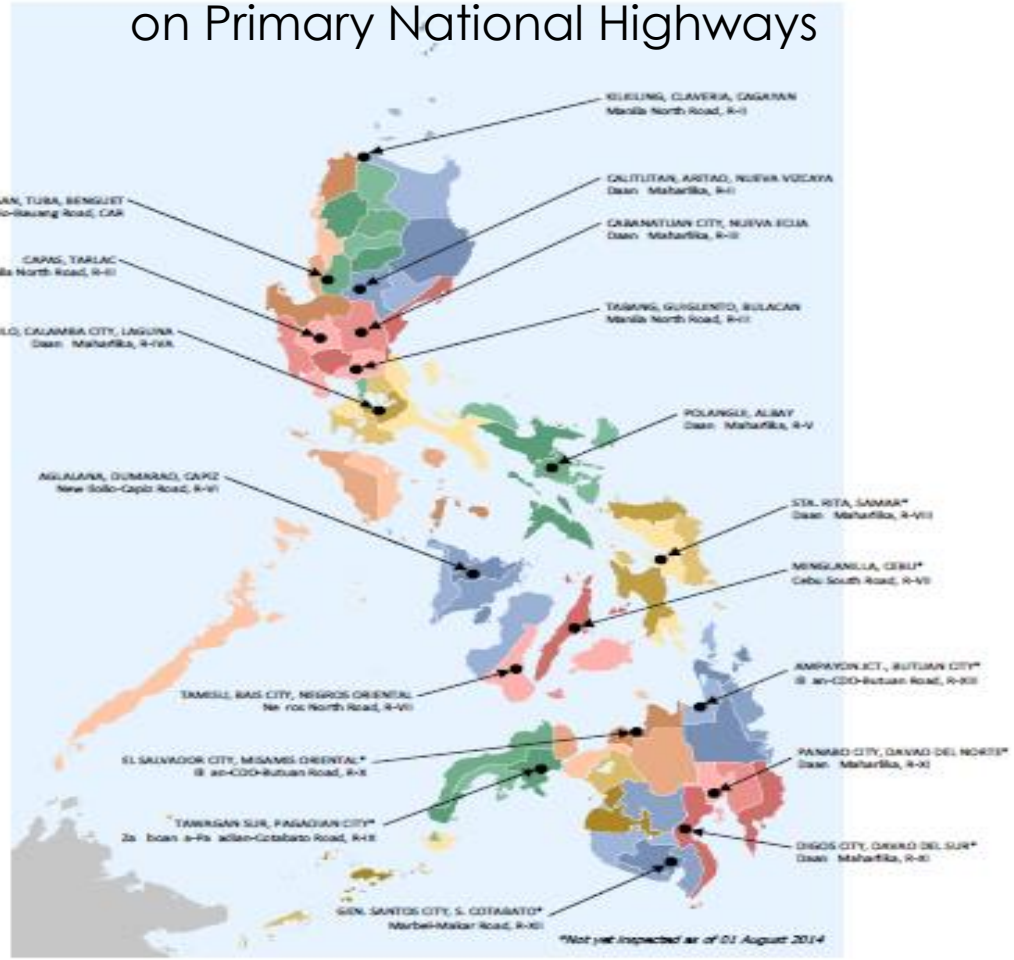


Permanent Weighbridge Stations with Lay-Bays

DPWH	•Install and Operate Weighbridge & Mobile Weighing stations
DOTC	•Impose Penalties thru issuance of TOP
DILG	•Disallow overloaded trucks on the roadway

[3] ANTI-TRUCK OVERLOADING PROGRAM

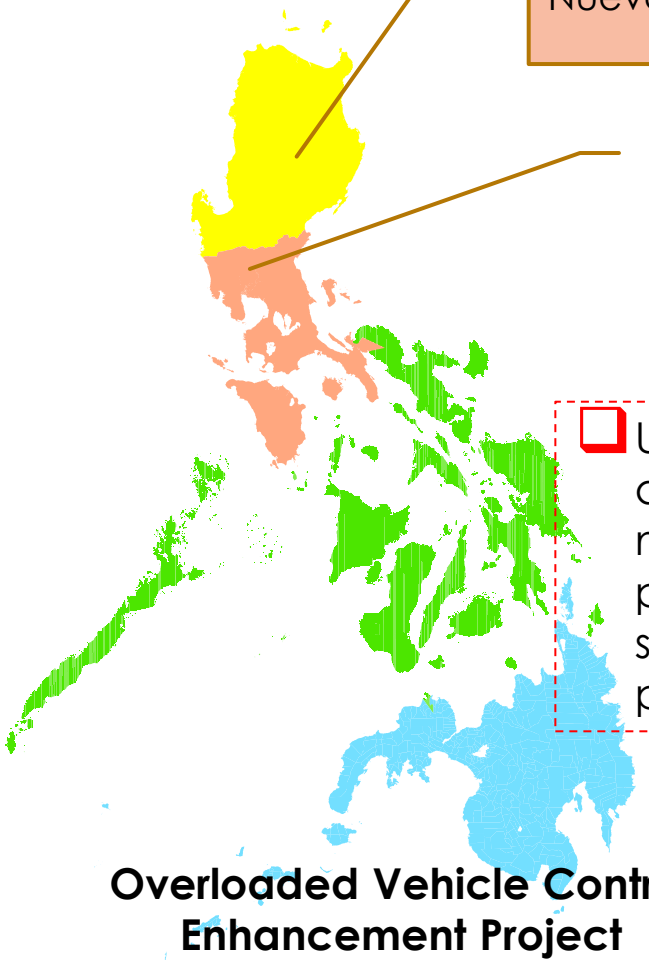
- 18 Permanent Weighbridges on Primary National Highways



- 15 Mobile Station within the Metro Manila Region

EXISTING ANTI-TRUCK OVERLOADING DEPLOYMENT ON NATIONAL HIGHWAYS

[3] ANTI-TRUCK OVERLOADING PROGRAM



Overloaded Vehicle Control Enhancement Project

- Utilizing the new technology approach to replace the manual based decisions in the process thru weigh in motion sensors and other advance peripheral equipment.

- The Government of the Philippines has received a Loan from Japan International Cooperation (JICA) towards the cost of Road Upgrading and Preservation Project (RUPP) dated March 31, 2011;
- It is intended that part of the proceeds of this Loan will be applied to eligible payments under the contract for ICD-1: Overloaded Vehicle Control Enhancement;
- As part of the implementation of the JRUPP ICD Component, there is a proposal to install High-Speed Weigh-In-Motion (HWIM) System on a pilot project basis focused on the Pre-Selection Application;
- Two sites were chosen along Maharlika Highway and currently under the Long Term Performance Based Maintenance (LTPBM) Contracts;

[3] ANTI-TRUCK OVERLOADING PROGRAM

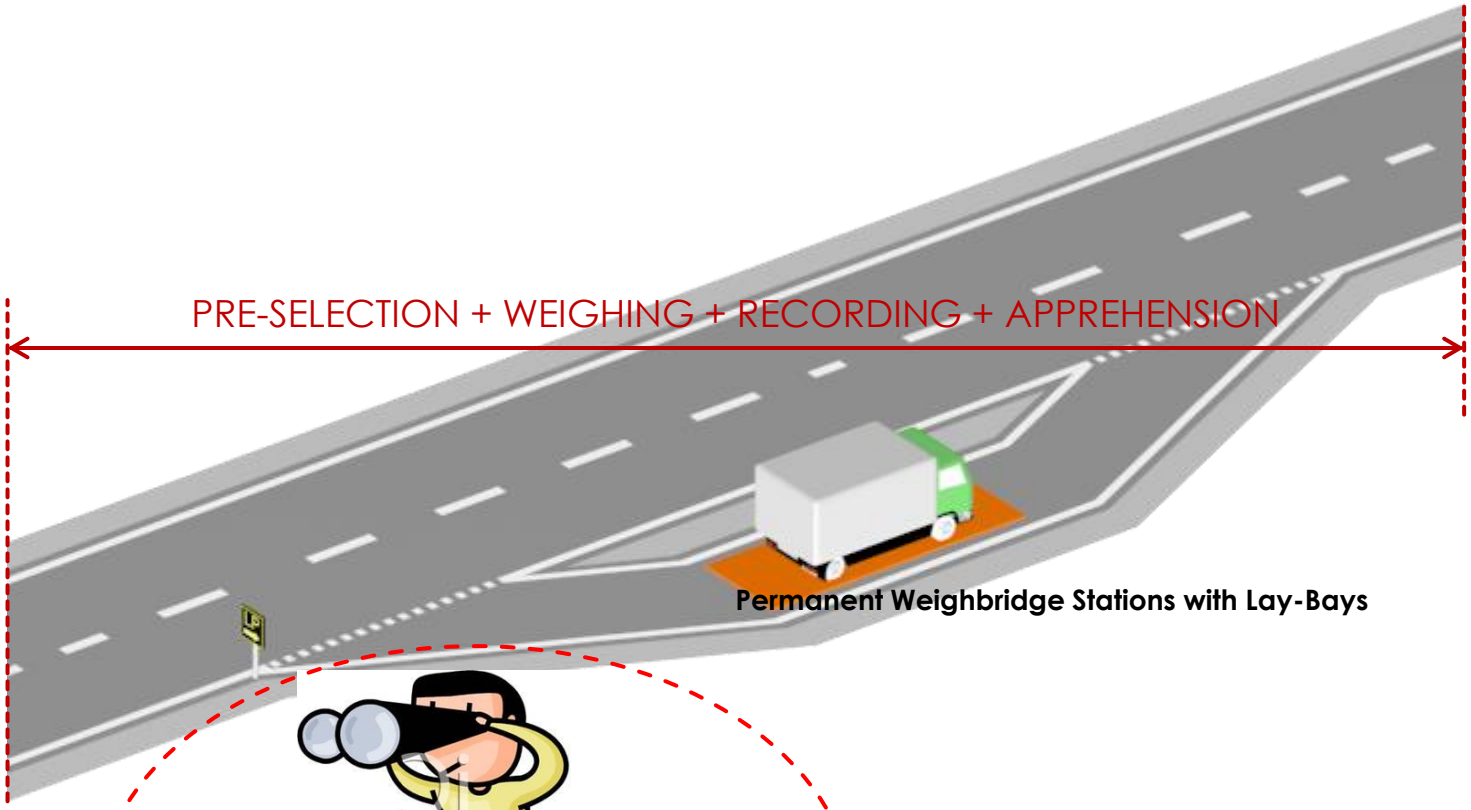
MECHANICS FOR IMPLEMENTING ANTI-TRUCK OVERLOADING PROGRAM

Pre-Selection – The flagman, located at the approach of the weighing station, identifies trucks that are possibly overloaded. Once possible overloaded trucks are spotted, the flagmen directs and guides the truck to the weighing area;

Weighing – Once the truck enters the weighing area, the scalemen, directs the driver to move the truck at the required speed for weighing using appropriate equipment. He gets the Official Receipt (OR) and/or Certificate of Registration (CR) of the truck and other documents from the driver and endorses them to the recorder. At the end of the process, he gives back the documents to the driver after processing and documentation;

Recording – The recorder monitors the reading in the weighing equipment and records the actual load per axle, the gross vehicle weight and the time and date it was taken on the prescribed form. In case of violation, the recorder fills-up the apprehension papers and records the corresponding data taken for the truck weighed and gives the copy to the Land Transportation Office (LTO) officer or to the LTO-deputized personnel detailed at the weighing station;

Apprehension – the LTO officer or its duly deputized personnel assigned at the station issues to the driver of the overloaded truck a Temporary Operator's Permit (TOP) indicating therein the excess load and the corresponding penalty to be paid.



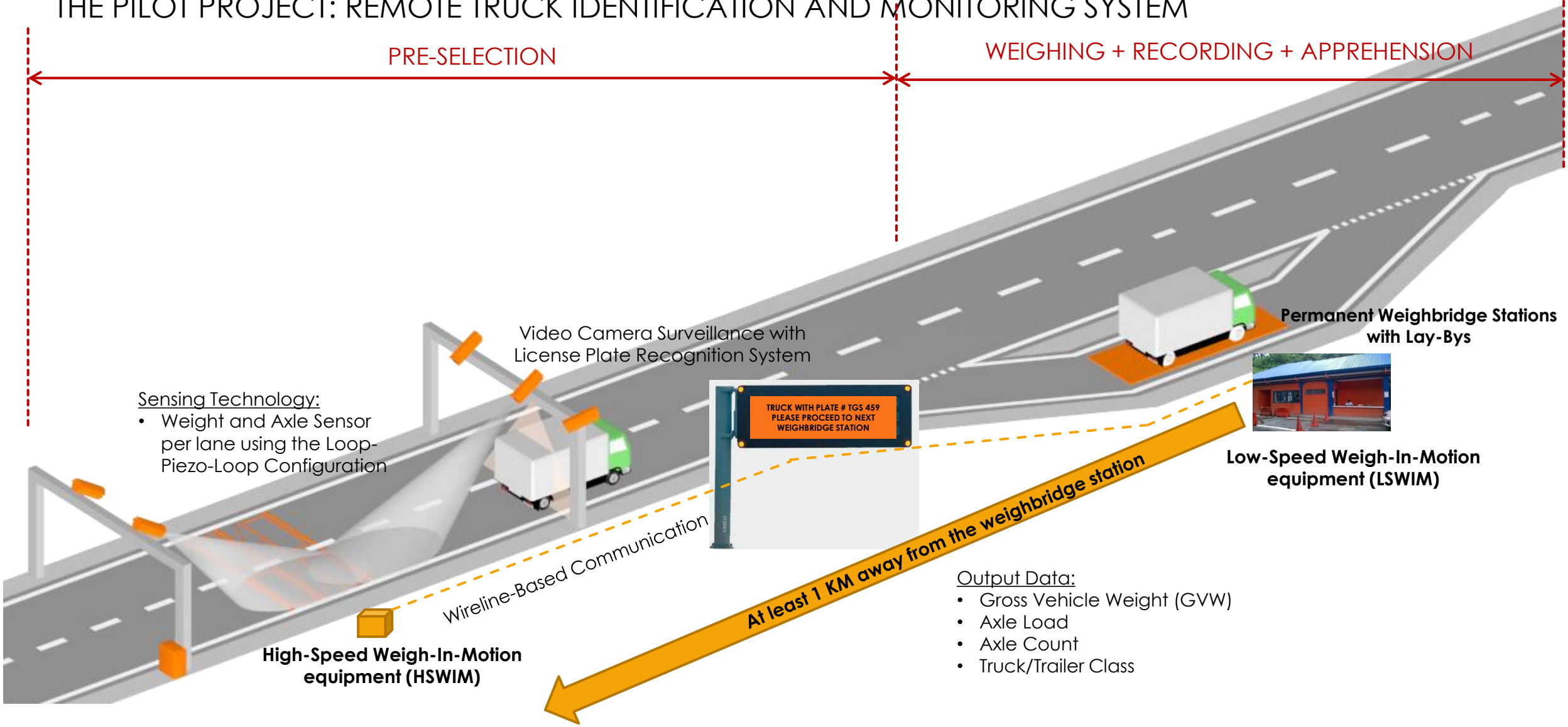
Permanent Weighbridge Stations with Lay-Bays

Pre-Selection Process

- The flagman identifies potentially overloaded trucks utilizing individual judgment based on observable characteristics of the truck such as speed, tire pressure, etc…

[3] ANTI-TRUCK OVERLOADING PROGRAM

THE PILOT PROJECT: REMOTE TRUCK IDENTIFICATION AND MONITORING SYSTEM



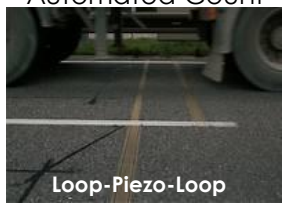
MOVING FORWARD: AN INTEGRATED ROAD MANAGEMENT SYSTEM

An Integrated System for Highway Planning, Operations & Maintenance

NRTSP

National Road Traffic Survey Program

Automated Count



Manual Count

Automated Axle Load Survey

Road Tubes

Permanent Stations Temporary Stations

RTIA

RBIA

AADT ESAL

Wireless Communications Systems

TRAFFIC SIGNALIZATION

Traffic Signalization of Critical Intersections Nationwide

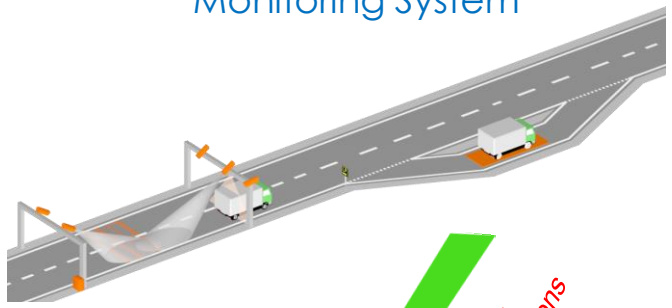
- Intelligent Intersection Sensors using video camera that can detect pedestrians and vehicles

Wireless Communications Systems

Computer Server

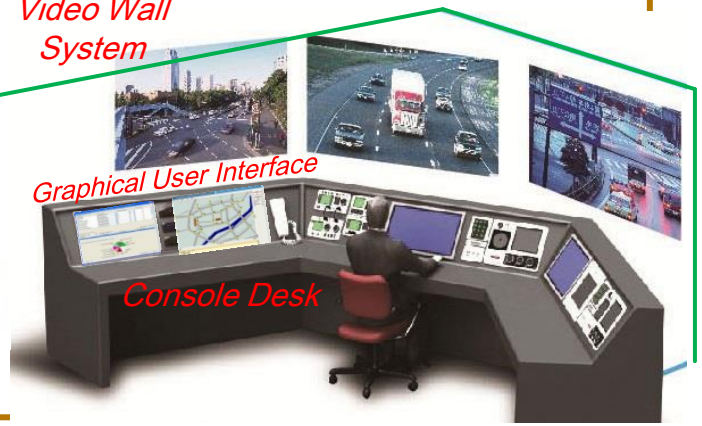
ANTI-RUCK OVERLOADING PROGRAM

Remote Truck Identification and Monitoring System



Wireless Communications Systems

Video Wall System



DIRECTION OF ITS DEPLOYMENT IN DPWH

DPWH envisions to have pilot ITS projects involving the following services:

1. A fully-automated traffic and axle load survey;
2. Traffic signalization of critical intersections along national roads using intelligent vehicle and pedestrian sensors (i.e., video technology);
3. A Traffic Monitoring Center outside Metro Manila *(initially covering Manila North Road and eventually major arterial roads nationwide)*
4. Expansion of Incident and Accident Monitoring System with the use of CCTV Cameras;
5. Provision of Variable Message Signboards;
6. Remote Truck Identification and Monitoring System


Thank You!!!